



Rec'd PCT/PTO 22 MAR 2002 #6

SEQUENCE LISTING

<110> Cahoon, Rebecca E.
Lee, Jian-Ming
Tao, Youn

<120> PLANT 1-DEOXY-D-XYLULOSE 5-PHOSPHATE REDUCTOISOMERASE

<130> BB-1297

<140> US/09/857,557

<141> 2001-09-22

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<151> 1998-12-04

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<211> 565

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<221> unsure

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ccctccctct cccctcctc gcccagcggc aattaccaca gcctccccag caagccggga 180
tggctgcact caaggcatcg ttccgggggtg agctcagcgc cgcttccttc ctgcactcca 240
gcaggggacc tctcgtccag cacaaagtgg attttacgtt tcaaaggaag ggcaaacgag 300
ctatttcact gagaaggaca tgctgttcta tgcaacaggc tccaccacca gcatggcctg 360
ggcgagctgt tgctgagcct ggccggagtc atgggatggc ccaaagccta tctcgattgt 420
tggttcaact ggttccatag gaacacagan attggacatt gttgcggaga atcctgataa 480
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<223> Xaa = ANY AMINO ACID

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1 5 10 15

Ser Thr Gly Ser Ile Gly Thr Gln Xaa Leu Asp Ile Val Ala Glu Asn
20 25 30

Pro Asp Lys Phe Arg Val Val Ala Leu Ala Ala Gly Ser Asn Val Thr
35 40 45

Leu Leu Ala Asp Gln Val Lys Thr Phe Xaa Pro Lys Leu Val Arg
50 55 60

<210> 3

<211> 868

<212> DNA

<213> Zea may

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<221> unsure

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ggttgtgcag ggctgaagcc tacagttgct gcaattgaag ctggtaaaga catagcattg 180
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aatatgggaa ggaagatcac agtagattct gctactttat tcaacaaggg tttagaagtt 480
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 20 25 30
Val Thr Val Val Thr Gly Ile Val Gly Cys Ala Gly Leu Lys Pro Thr
 35 40 45
Val Ala Ala Ile Glu Ala Gly Lys Asp Ile Ala Leu Ala Asn Lys Glu
 50 55 60
Thr Leu Ile Ala Gly Gly Pro Phe Val Leu Pro Leu Ala His Lys His
 65 70 75 80
Lys Val Lys Ile Leu Pro Ala Asp Ser Glu His Ser Ala Ile Phe Gln
 85 90 95
Cys Ile Gln Gly Leu Ser Glu Gly Ala Leu Arg Arg Ile Ile Leu Thr
 100 105 110
Ala Ser Xaa Gly Ala Phe Xaa Asp Trp Pro Xaa Asp Arg Leu Lys Asp
 115 120 125
Val Lys Val Ala Asp Ala Leu Lys His Pro Asn Trp Asn Met Gly Arg
 130 135 140
Lys Ile Thr Val Asp Ser Ala Thr Leu Phe Asn Lys Gly Leu Glu Val
 145 150 155 160
Ile Glu Ala His Tyr Leu Phe Gly Ala Glu Tyr Asp Asp Ile Glu Ile
 165 170 175

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Val Ile His Pro Gln Ser Ile Ile His Ser Met Val Glu Thr Gln Asp
180 185 190

Ser Ser Val Leu Ala Gln Leu Gly Trp Pro Asp Met Arg Leu Pro Ile
195 200 205

Leu Tyr Thr Leu Ser Trp Pro Asp Arg
210 215

<210> 5
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<212> DNA
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gctcaaggtc gtctctttcc cgggggactt ggccgcggtc tcattcctcg actccaacag 240
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tggctcaacc ggttctattg gcacacagac attggacata gttgcggaga atccagataa 480
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<213> Oryza sativa

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20 25 30

Leu	Pro	Phe	Gln	Thr	Arg	Asp	Arg	Arg	Ala	Val	Ser	Leu	Arg	Arg	Thr	35	40	45
Cys	Cys	Ser	Met	Gln	Gln	Ala	Pro	Pro	Pro	Ala	Trp	Pro	Gly	Arg	Ala	50	55	60
Val	Val	Glu	Pro	Gly	Arg	Arg	Ser	Trp	Asp	Gly	Pro	Lys	Pro	Ile	Ser	65	70	75
Ile	Val	Gly	Ser	Thr	Gly	Ser	Ile	Gly	Thr	Gln	Thr	Leu	Asp	Ile	Val	85	90	95
Ala	Glu	Asn	Pro	Asp	Lys	Phe	Arg	Val	Val	Ala	Leu	Ala	Ala	Gly	Ser	100	105	110
Asn	Val	Thr	Leu	Leu	Ala	Asp	Gln	Val	Lys	Thr	Phe	Lys	Pro	Lys	Leu	115	120	125
Val	Ala	Val	Arg	Asn	Glu	Ser	Leu	Val	Asp	Glu	Leu	Lys	Glu	Ala	Leu	130	135	140
Ala	Asp	Cys	Asp	Trp	Lys	Pro	Glu	Ile	Ile	Pro	Gly	Glu	Gln	Gly	Val	145	150	155
Ile	Glu	Val	Ala	Arg	His	Pro	Asp	Ala	Val	Thr	Val	Val	Thr	Gly	Ile	165	170	175
Val	Gly	Cys	Ala	Gly	Leu	Lys	Pro	Thr	Val	Ala	Ala	Ile	Glu	Ala	Gly	180	185	190
Lys	Asp	Ile	Ala	Leu	Ala	Asn	Lys	Glu	Thr	Leu	Ile	Ala	Gly	Gly	Pro	195	200	205
Phe	Val	Leu	Pro	Leu	Ala	Gln	Lys	His	Lys	Val	Lys	Ile	Leu	Pro	Ala	210	215	220
Asp	Ser	Glu	His	Ser	Ala	Ile	Phe	Gln	Cys	Ile	Gln	Gly	Leu	Pro	Glu	225	230	235
Gly	Ala	Leu	Arg	Arg	Ile	Ile	Leu	Thr	Ala	Ser	Gly	Gly	Ala	Phe	Arg	245	250	255
Asp	Trp	Pro	Val	Asp	Lys	Leu	Lys	Glu	Val	Lys	Val	Ala	Asp	Ala	Leu	260	265	270
Lys	His	Pro	Asn	Trp	Asn	Met	Gly	Lys	Lys	Ile	Thr	Val	Asp	Ser	Ala	275	280	285
Thr	Leu	Phe	Asn	Lys	Gly	Leu	Glu	Val	Ile	Glu	Ala	His	Tyr	Leu	Phe	290	295	300
Gly	Ala	Glu	Tyr	Asp	Asp	Ile	Glu	Ile	Val	Ile	His	Pro	Gln	Ser	Ile	305	310	315
Ile	His	Ser	Met	Ile	Glu	Thr	Gln	Asp	Ser	Ser	Val	Leu	Ala	Gln	Leu	325	330	335
Gly	Trp	Pro	Asp	Met	Arg	Ile	Pro	Thr	Leu	Tyr	Thr	Met	Ser	Trp	Pro	340	345	350

Asp Arg Ile Tyr Cys Ser Glu Val Thr Trp Pro Arg Leu Asp Leu Cys
 355 360 365
 Lys Leu Gly Ser Leu Thr Phe Lys Ala Pro Asp Asn Val Lys Tyr Pro
 370 375 380
 Ser Met Asp Leu Ala Tyr Ala Ala Gly Arg Ala Gly Gly Thr Met Thr
 385 390 395 400
 Gly Val Leu Ser Ala Ala Asn Glu Lys Ala Val Glu Leu Phe Ile Asp
 405 410 415
 Glu Lys Ile Gly Tyr Leu Asp Ile Phe Lys Val Val Glu Leu Thr Cys
 420 425 430
 Asp Ala His Arg Asn Glu Leu Val Thr Arg Pro Ser Leu Glu Glu Ile
 435 440 445
 Ile His Tyr Asp Leu Trp Ala Arg Glu Tyr Ala Ala Ser Leu Gln Pro
 450 455 460
 Ser Thr Gly Leu Ser Pro Val Pro Val
 465 470

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 agtgacacaa cagtagagag acgagtttat tgctctgccg ctgctcaatc accaccacca 180
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 gagttcccag aaagatttaa agttgtgagc cttgctgctg gctctaatat tactcttctt 360
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 aacataaaaa ttcttcccgc tgattcggaa cattctgcaa ttttccagtc tatccagggg 720
 ttgccaaagg gtgcacttag gaaaatcctt ttaactggat caggaggtgc tttcagagaa 780
 tggcctgctg aaaaagatgaa agatattaag cttgctgatg cattaaagca tcccatatgg 840
 agtttgggga gaaaaataac tattgactct gctacccttt tcaataaggg tctagaagta 900
 attgaagcac attacttgtt tggagcaagc tatgacgata ttgagattgt tattcatcct 960
 caatccatca tacattcctt ggttgaaacg cangattcat ctgttaatgc acagttgggg 1020
 atacctgaca tgcgcttacc gtccttttat acattatctt ggccagaaag aatctattgc 1080
 tctgaagtaa cttggcctcg tcttgatctt agcaagtatg gttctctaac attttatgca 1140

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ccggatgaca agaagtttcc atcgggtgaat ctttgctatg ctgcggggacg tgctggaggc 1200
accatgacag gagttcttag tgcagcaaat gagaaagctg tagaaatggt tgttgaagaa 1260
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<213> Glycine max

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Lys Asp Ser Asp Thr Thr Val Glu Arg Arg Val Tyr Cys Ser Ala Ala
              35              40              45
Ala Gln Ser Pro Pro Pro Ala Trp Pro Gly Thr Ala Ile Pro Glu Pro
              50              55              60
Ser Asp Phe Lys Thr Trp Asp Gly Gln Lys Pro Ile Ser Val Leu Gly
              65              70              75              80
Ser Thr Gly Ser Ile Gly Thr Gln Thr Leu Ser Ile Val Ala Glu Phe
              85              90              95
Pro Glu Arg Phe Lys Val Val Ser Leu Ala Ala Gly Ser Asn Ile Thr
              100              105              110
Leu Leu Ala Asp Gln Ile Lys Thr Phe Lys Pro Glu Val Val Gly Leu
              115              120              125
Arg Asn Glu Ser Leu Ile Asp Glu Leu Lys Glu Ala Leu Ala Asp Val
              130              135              140
Asp His Lys Pro Glu Ile Ile Pro Gly Glu Gln Gly Val Ile Glu Ala
              145              150              155              160
Ala Arg His Pro Asp Ala Thr Thr Val Val Thr Gly Ile Val Gly Cys
              165              170              175
Ala Gly Leu Lys Pro Thr Val Ala Ala Ile Glu Ala Gly Lys Asp Ile
              180              185              190

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Ala	Leu	Ala	Asn	Lys	Glu	Thr	Met	Ile	Ala	Gly	Ala	Pro	Phe	Val	Leu	195	200	205	
Pro	Leu	Ala	His	Lys	His	Asn	Ile	Lys	Ile	Leu	Pro	Ala	Asp	Ser	Glu	210	215	220	
His	Ser	Ala	Ile	Phe	Gln	Ser	Ile	Gln	Gly	Leu	Pro	Lys	Gly	Ala	Leu	225	230	235	240
Arg	Lys	Ile	Leu	Leu	Thr	Gly	Ser	Gly	Gly	Ala	Phe	Arg	Glu	Trp	Pro	245	250	255	
Ala	Glu	Lys	Met	Lys	Asp	Ile	Lys	Leu	Ala	Asp	Ala	Leu	Lys	His	Pro	260	265	270	
Ile	Trp	Ser	Leu	Gly	Arg	Lys	Ile	Thr	Ile	Asp	Ser	Ala	Thr	Leu	Phe	275	280	285	
Asn	Lys	Gly	Leu	Glu	Val	Ile	Glu	Ala	His	Tyr	Leu	Phe	Gly	Ala	Ser	290	295	300	
Tyr	Asp	Asp	Ile	Glu	Ile	Val	Ile	His	Pro	Gln	Ser	Ile	Ile	His	Ser	305	310	315	320
Leu	Val	Glu	Thr	Xaa	Asp	Ser	Ser	Val	Asn	Ala	Gln	Leu	Gly	Ile	Pro	325	330	335	
Asp	Met	Arg	Leu	Pro	Leu	Leu	Tyr	Thr	Leu	Ser	Trp	Pro	Glu	Arg	Ile	340	345	350	
Tyr	Cys	Ser	Glu	Val	Thr	Trp	Pro	Arg	Leu	Asp	Leu	Ser	Lys	Tyr	Gly	355	360	365	
Ser	Leu	Thr	Phe	Tyr	Ala	Pro	Asp	Asp	Lys	Lys	Phe	Pro	Ser	Val	Asn	370	375	380	
Leu	Cys	Tyr	Ala	Ala	Gly	Arg	Ala	Gly	Gly	Thr	Met	Thr	Gly	Val	Leu	385	390	395	400
Ser	Ala	Ala	Asn	Glu	Lys	Ala	Val	Glu	Met	Phe	Val	Glu	Glu	Lys	Ile	405	410	415	
Ser	Tyr	Leu	Asp	Ile	Phe	Lys	Val	Val	Glu	Leu	Thr	Cys	Gln	Glu	His	420	425	430	
Gln	Lys	Glu	Leu	Val	Ala	Ser	Pro	Ser	Leu	Glu	Glu	Ile	Ile	His	Tyr	435	440	445	
Asp	Gln	Trp	Ala	Arg	Gln	Tyr	Ala	Ala	Ser	Leu	Gln	Lys	Xaa	Phe	Lys	450	455	460	
Cys	Leu	Asn	Pro	Ile	Phe	Leu	Thr	Tyr	Phe	Arg	Ser	Trp	Gly	Cys	Gly	465	470	475	480
Gly	Leu	Leu	Ala	Thr	Ala	Ser	Ile	Phe	Cys	Lys	Cys	Ile	Val	Gly	Ser	485	490	495	
Ser	Ile	Leu																	

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 gttgtggcac ttgcagctgg ttcaaagtgt actcttcttg cagaccaggt aaaaagattt 240
 aagcctcaac ttgttgctgt tagaaatgag tccctaattg ctgaacttga agaggccttg 300
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 20 25 30
 Lys Pro Ile Ser Ile Val Gly Ser Thr Gly Ser Ile Gly Thr Gln Thr
 35 40 45
 Leu Asp Ile Val Ala Glu Asn Pro Asp Lys Phe Lys Val Val Ala Leu
 50 55 60
 Ala Ala Gly Ser Asn Val Thr Leu Leu Ala Asp Gln Val Lys Arg Phe
 65 70 75 80
 Lys Pro Gln Leu Val Ala Val Arg Asn Glu Ser Leu Ile Ala Glu Leu
 85 90 95

Glu Glu Ala Leu His Asp Val Glu Glu Lys Pro Glu Ile Ile Pro Gly
 100 105 110
 Glu Gln Gly Ile Ile Glu Val Ala Arg His Pro Asp Ala Val Ser Val
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 Val Thr Gly Ile Val Gly Cys Ala Gly Leu Lys Pro Thr Val Ala Ala
 130 135 140
 Ile Glu Ala Gly Lys Asp Ile Ala Leu Ala Asn Lys Glu Thr Leu Ile
 145 150 155 160
 Ala Gly Gly Pro Leu Ser Pro Leu Ala Gln Lys His Asn Val Lys Ile
 165 170 175
 Leu Pro Ala Asp Ser Asp Xaa Ser Ala Ile Phe Gln Cys Ile Gln Gly
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 <212> DNA
 <213> Triticum aestivum

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 ccgggttgct gcccttgctg ctgggtccaa cgtcactcct ctagctgata aggtgaaaac 360
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 <212> PRT
 <213> Triticum aestivum

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 35 40 45
 Leu Thr Ser Ser Arg Val Val Ala Leu Ala Ala Gly Ser Asn Val Thr
 50 55 60
 Pro Leu Ala Asp Lys Val Lys Thr Phe Lys Pro Asn Trp Val Val Leu
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 gtacgcggca gggcgagccg ggggcacat gacgggattt ttgagtgtg ctaatgagaa 240
 ggcgtggagc ttgttcacgc acgaaaagat taactacctt ggacatcttc aaggngggng 300
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 <212> PRT
 <213> Triticum aestivum

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 <222> (59)
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 20 25 30
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 35 40 45

Asp Asn Val Lys Tyr Pro Ser Val Asp Leu Xaa Xaa Tyr Ala Ala Gly
50 55 60

Arg Ala Gly Gly Thr Met Thr Gly Phe Leu Ser Ala Ala Asn Glu Lys
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Ala Trp Ser Leu Phe Ile Asp Glu Lys Ile Asn Tyr Leu
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<210> 15
<211> 1847
<212> DNA
<213> Zea mays

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<210> 16
<211> 472
<212> PRT
<213> Zea mays

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 355 360 365
 Leu Gly Ser Leu Thr Phe Arg Ala Pro Asp Asn Val Lys Tyr Pro Ser
 370 375 380
 Met Asp Leu Ala Tyr Ala Ala Gly Arg Ala Gly Gly Thr Met Thr Gly
 385 390 395 400
 Val Leu Ser Ala Ala Asn Glu Lys Ala Val Glu Leu Phe Ile Asp Glu
 405 410 415
 Lys Ile Ser Tyr Leu Asp Ile Phe Lys Val Val Glu Leu Thr Cys Asn
 420 425 430
 Ala His Arg Asn Glu Leu Val Thr Ser Pro Ser Leu Glu Glu Ile Val
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 450 455 460
 Ser Gly Leu Ser Pro Val Pro Ala
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<210> 17
 <211> 2019
 <212> DNA
 <213> Glycine max

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<210> 18
<211> 475
<212> PRT
<213> Glycine max

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Gly Phe Ala Phe Lys Arg Lys Glu Arg Arg Ala Ala Ser Gly Gly Arg
      35             40             45

Val Tyr Cys Ser Val Gln Ala Thr Pro Pro Pro Pro Ala Trp Pro Gly
      50             55             60

Arg Ala Val Pro Glu Gln Gly Arg Lys Thr Trp Asp Gly Pro Lys Pro
      65             70             75             80

Ile Ser Ile Val Gly Ser Thr Gly Ser Ile Gly Thr Gln Thr Leu Asp
      85             90             95

Ile Val Ala Glu Asn Pro Asp Lys Phe Lys Val Val Ala Leu Ala Ala
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Gly Ser Asn Val Thr Leu Leu Ala Asp Gln Val Lys Arg Phe Lys Pro
      115            120            125

Gln Leu Val Ala Val Arg Asn Glu Ser Leu Ile Ala Glu Leu Glu Glu
      130            135            140

Ala Leu His Asp Val Glu Glu Lys Pro Glu Ile Ile Pro Gly Glu Gln
      145            150            155            160

Gly Ile Ile Glu Val Ala Arg His Pro Asp Ala Val Ser Val Val Thr
      165            170            175

Gly Ile Val Gly Cys Ala Gly Leu Lys Pro Thr Val Ala Ala Ile Glu
      180            185            190

Ala Gly Lys Asp Ile Ala Leu Ala Asn Lys Glu Thr Leu Ile Ala Gly
      195            200            205

Gly Pro Phe Val Leu Pro Leu Ala Gln Lys His Asn Val Lys Ile Leu
      210            215            220

Pro Ala Asp Ser Glu His Ser Ala Ile Phe Gln Cys Ile Gln Gly Leu
      225            230            235            240

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<211> 473
<212> PRT
<213> Triticum aestivum

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35 40 45
Cys Ser Met Gln Gln Gly Pro Pro Pro Ala Trp Pro Gly Arg Ala Val
50 55 60
Ala Glu Pro Glu Arg Arg Ser Trp Glu Gly Pro Lys Pro Ile Ser Ile
65 70 75 80
Val Gly Ser Thr Gly Ser Ile Gly Thr Gln Thr Leu Asp Ile Val Ala
85 90 95
Glu Asn Pro Asp Lys Phe Arg Val Val Ala Leu Ala Ala Gly Ser Asn
100 105 110
Val Thr Leu Leu Ala Asp Gln Val Lys Thr Phe Lys Pro Lys Leu Val
115 120 125
Ala Val Arg Asn Glu Ser Leu Leu Asn Glu Leu Lys Glu Ala Leu Ala
130 135 140
Gly Cys Glu Glu Met Pro Glu Ile Ile Pro Gly Glu Gln Gly Val Ile
145 150 155 160
Glu Val Ala Arg His Pro Asp Ala Val Thr Val Val Thr Gly Ile Val
165 170 175
Gly Cys Ala Gly Leu Lys Pro Thr Val Ala Ala Ile Glu Ala Gly Lys

180					185					190					
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Val	Leu	Pro	Leu	Ala	His	Lys	His	Asn	Val	Lys	Ile	Leu	Pro	Ala	Asp
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Ser	Glu	His	Ser	Ala	Ile	Phe	Gln	Cys	Ile	Gln	Gly	Leu	Ser	Glu	Gly
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His	Pro	Asn	Trp	Ser	Met	Gly	Lys	Lys	Ile	Thr	Val	Asp	Ser	Ala	Thr
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	290					295					300				
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His	Ser	Met	Ile	Glu	Thr	Gln	Asp	Ser	Ser	Val	Leu	Ala	Gln	Leu	Gly
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			340					345					350		
Arg	Val	Tyr	Cys	Ser	Glu	Val	Thr	Trp	Pro	Arg	Leu	Asp	Leu	Cys	Lys
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Val	Asp	Leu	Ala	Tyr	Ala	Ala	Gly	Arg	Ala	Gly	Gly	Thr	Met	Thr	Gly
	385				390					395					400
Val	Leu	Ser	Ala	Ala	Asn	Glu	Lys	Ala	Val	Glu	Leu	Phe	Ile	Asp	Glu
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Lys	Ile	Ser	Tyr	Leu	Asp	Ile	Phe	Lys	Val	Val	Glu	Met	Thr	Cys	Asp
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 <211> 406
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<400> 21

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			20					25					30			
Pro	Asp	Lys	Phe	Arg	Val	Val	Ala	Leu	Ala	Ala	Gly	Ser	Asn	Val	Thr	
		35					40					45				
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65					70					75					80	
Asp	Tyr	Lys	Leu	Glu	Ile	Ile	Pro	Gly	Glu	Gln	Gly	Val	Ile	Glu	Val	
				85					90					95		
Ala	Arg	His	Pro	Glu	Ala	Val	Thr	Val	Val	Thr	Gly	Ile	Val	Gly	Cys	
			100					105					110			
Ala	Gly	Leu	Lys	Pro	Thr	Val	Ala	Ala	Ile	Glu	Ala	Gly	Lys	Asp	Ile	
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Ala	Leu	Ala	Asn	Lys	Glu	Thr	Leu	Ile	Ala	Gly	Gly	Pro	Phe	Val	Leu	
	130					135					140					
Pro	Leu	Ala	Asn	Lys	His	Asn	Val	Lys	Ile	Leu	Pro	Ala	Asp	Ser	Glu	
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His	Ser	Ala	Ile	Phe	Gln	Cys	Ile	Gln	Gly	Leu	Pro	Glu	Gly	Ala	Leu	
				165					170					175		
Arg	Lys	Ile	Ile	Leu	Thr	Ala	Ser	Gly	Gly	Ala	Phe	Arg	Asp	Trp	Pro	
			180					185					190			
Val	Glu	Lys	Leu	Lys	Glu	Val	Lys	Val	Ala	Asp	Ala	Leu	Lys	His	Pro	
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Asn	Trp	Asn	Met	Gly	Lys	Lys	Ile	Thr	Val	Asp	Ser	Ala	Thr	Leu	Phe	
	210					215					220					
Asn	Lys	Gly	Leu	Glu	Val	Ile	Glu	Ala	His	Tyr	Leu	Phe	Gly	Ala	Glu	
225					230					235					240	
Tyr	Asp	Asp	Ile	Glu	Ile	Val	Ile	His	Pro	Gln	Ser	Ile	Ile	His	Ser	
				245					250					255		
Met	Ile	Glu	Thr	Gln	Asp	Ser	Ser	Val	Leu	Ala	Gln	Leu	Gly	Trp	Pro	
			260					265					270			
Asp	Met	Arg	Leu	Pro	Ile	Leu	Tyr	Thr	Met	Ser	Trp	Pro	Asp	Arg	Val	
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 370 375 380
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 385 390 395 400
 Ala Arg Pro Val His Ala
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<400> 22
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 Gly Gly Phe Ala Phe Lys Arg Lys Asp Ser Arg Cys Thr Ala Ala Lys
 35 40 45
 Arg Val His Cys Ser Ala Gln Ser Gln Ser Pro Pro Pro Ala Trp Pro
 50 55 60
 Gly Arg Ala Phe Pro Glu Pro Gly Arg Met Thr Trp Glu Gly Pro Lys
 65 70 75 80
 Pro Ile Ser Val Ile Gly Ser Thr Gly Ser Ile Gly Thr Gln Thr Leu
 85 90 95
 Asp Ile Val Ala Glu Asn Pro Asp Lys Phe Arg Ile Val Ala Leu Ala
 100 105 110
 Ala Gly Ser Asn Val Thr Leu Leu Ala Asp Gln Lys Ala Phe Lys Pro
 115 120 125
 Lys Leu Val Ser Val Lys Asp Glu Ser Leu Ile Ser Glu Leu Lys Glu
 130 135 140
 Ala Leu Ala Gly Phe Glu Asp Met Pro Glu Ile Ile Pro Gly Glu Gln
 145 150 155 160
 Gly Met Ile Glu Val Ala Arg His Pro Asp Ala Val Thr Val Val Thr
 165 170 175
 Gly Ile Val Gly Cys Ala Gly Leu Lys Pro Thr Val Ala Ala Ile Glu

180						185						190					
Ala	Gly	Lys	Asp	Ile	Ala	Leu	Ala	Asn	Lys	Glu	Thr	Leu	Ile	Ala	Gly		
		195					200						205				
Gly	Pro	Phe	Val	Leu	Pro	Leu	Ala	Lys	Lys	His	Asn	Val	Lys	Ile	Leu		
	210						215				220						
Pro	Ala	Asp	Ser	Glu	His	Ser	Ala	Ile	Phe	Gln	Cys	Ile	Gln	Gly	Leu		
	225				230					235					240		
Pro	Glu	Gly	Ala	Leu	Arg	Arg	Ile	Ile	Leu	Thr	Ala	Ser	Gly	Gly	Ala		
				245					250					255			
Phe	Arg	Asp	Leu	Pro	Val	Glu	Lys	Leu	Lys	Glu	Val	Lys	Val	Ala	Asp		
		260						265					270				
Ala	Leu	Lys	His	Ser	Asn	Trp	Asn	Met	Gly	Lys	Lys	Asn	Thr	Val	Arg		
		275					280						285				
Leu	Leu	Gln	Leu	Phe	Phe	Asn	Lys	Gly	Leu	Glu	Val	Ile	Lys	Ala	His		
	290						295				300						
Tyr	Leu	Phe	Gly	Ala	Glu	Tyr	Asp	Asp	Ile	Glu	Ile	Val	Ile	His	Ser		
	305				310					315					320		
Pro	Ser	Ile	Ile	His	Ser	Met	Val	Glu	Thr	Gln	Asp	Ser	Ser	Val	Leu		
				325					330					335			
Ala	Gln	Leu	Gly	Trp	Pro	Asp	Met	Arg	Leu	Pro	Ile	Leu	Tyr	Thr	Leu		
			340					345					350				
Ser	Trp	Pro	Glu	Arg	Val	Tyr	Cys	Ser	Glu	Ile	Thr	Trp	Pro	Arg	Leu		
		355					360						365				
Asp	Leu	Cys	Lys	Val	Asp	Leu	Pro	Phe	Lys	Lys	Pro	Asp	Asn	Arg	Glu		
	370						375				380						
Ile	Pro	Ala	Met	Asp	Leu	Ala	Tyr	Ala	Ala	Trp	Lys	Ser	Arg	Ser	Thr		
	385				390					395					400		
Met	Thr	Gly	Val	Leu	Ser	Ala	Ala	Asn	Glu	Lys	Ala	Val	Glu	Met	Phe		
				405					410					415			
Ile	Asp	Glu	Lys	Ile	Gly	Tyr	Leu	Asp	Ile	Phe	Lys	Val	Val	Glu	Leu		
			420					425					430				
Thr	Cys	Asp	Lys	His	Arg	Ser	Glu	Met	Ala	Val	Ser	Pro	Ser	Leu	Glu		
		435					440						445				
Glu	Ile	Val	His	Tyr	Asp	Gln	Trp	Ala	Arg	Asp	Tyr	Ala	Ala	Thr	Val		
	450						455				460						
Leu	Lys	Ser	Ala	Gly	Leu	Ser	Pro	Ala	Leu	Val							
	465				470					475							